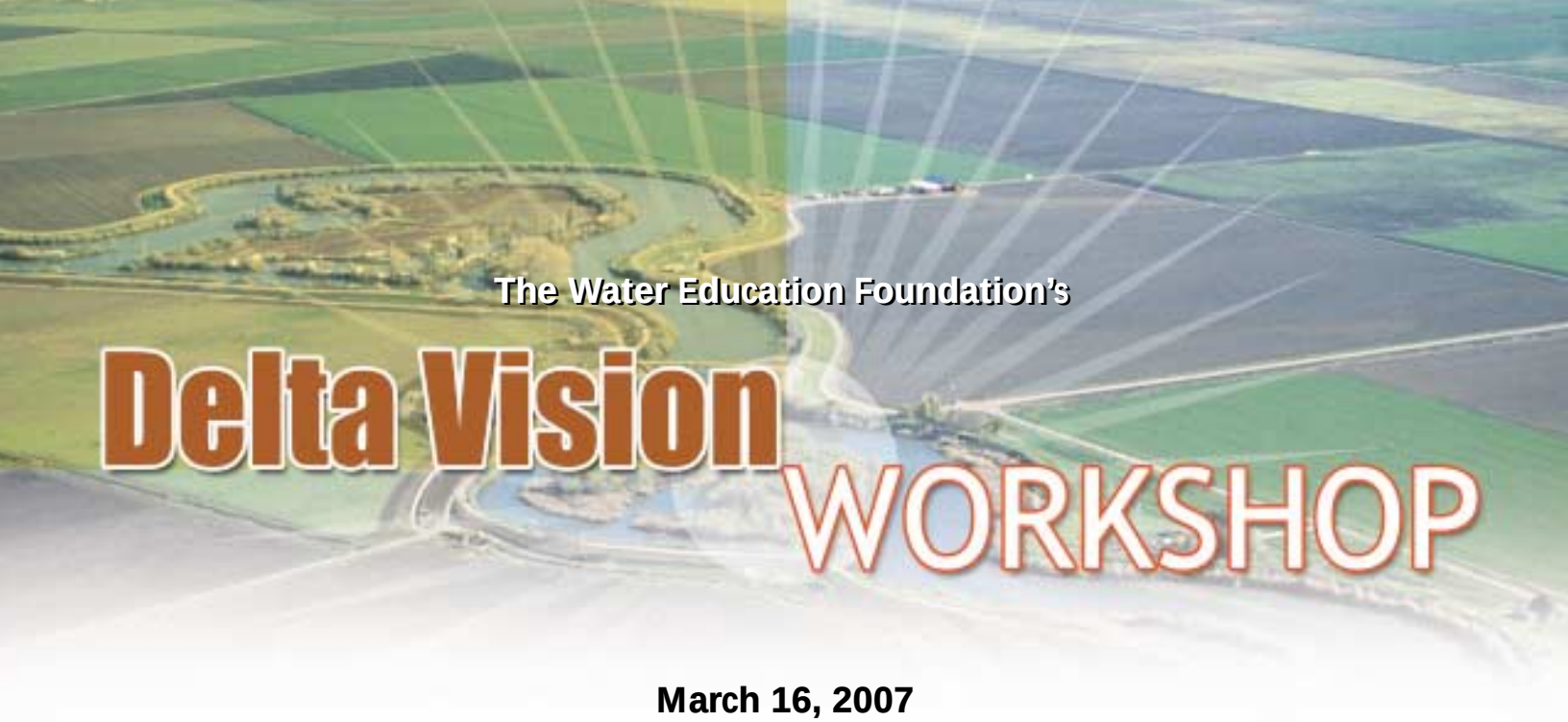

The Water Education Foundation's

Delta Vision WORKSHOP

March 16, 2007

Suisun City, CA

Sponsored by:

Water Education Foundation

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CONFERENCE SUMMARY

Prepared by the

WATER EDUCATION FOUNDATION

Acknowledgements

The agenda for the Delta Vision Workshop was developed by the Water Education Foundation with input from an advisory committee:

Margit Aramburu, *University of the Pacific Natural Resources Institute*
Greg Bourne, *Center for Collaborative Policy*
Marci Coglianese, *former mayor of Rio Vista*
Kamyar Guivetchi, *California Department of Water Resources*
David Guy, *Northern California Water Association*
Jonas Minton, *Planning and Conservation League*
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Tim Quinn, *MWD of Southern California*
Anthony Saracino, *The Nature Conservancy*
Brent Walthall, *Kern County Water Agency*
Tom Zuckerman, *Central Delta Water Agency*
Greg Zlotnick, *Santa Clara Valley Water District*

Staff from the Water Education Foundation took notes throughout the Delta Vision Workshop for the preparation of this document. ***Please note that this is not a word-for-word transcript. It is a summary of the major points of discussion among the speakers and a summary of the self-facilitated participant breakout groups.***

The PowerPoint presentations presented at the March 16 workshop can be found on the Foundation's web site http://www.watereducation.org/Deltavisionworkshops

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WATER EDUCATION FOUNDATION

Welcome and Opening Remarks

Rita Schmidt Sudman, Executive Director, Water Education Foundation, welcomed the participants. She noted that this was the second in what is to be a series of workshops to be held around the state. We all know that Katrina was a big wake up call regarding the levees and the threat of flooding. But we know the Delta has a lot of other values and that you're here because you love the Delta, you live here or you're involved in recreation. We see the Delta for all of these multiple uses but the Delta truly is the heart of the water system. Everyone in the state needs to understand the Delta and how we are all connected. She thanked the Resources Agency for providing grant funding for the workshop, allowing the Foundation to offer free attendance. She also thanked Solano County Supervisors Mark Reagan and Jim Spering for helping the Foundation secure the recreation center for the meeting.

Beginning to Craft a Delta Vision

Solano County Supervisor Mike Reagan opened his remarks by asking people to deal with facts about the Delta and not theories about the region. Property records for the Delta go back to the 1860s, Reagan said. This land in the Delta was swamp he said of the region's history. We spent the last 100 years of California history draining this swamp. He went on to say that then we started loving it to death. We ignored the economic underpinnings of maintaining what we built. Water export is only one of the Delta's functions. He asked, how are going to restore the economic sustainability of the Delta? If the area were in Minnesota or a lake in the Midwest, the Delta's recreational resources would be marketed as a tourism site.

The State of the Delta: The Draft Status and Trends Report

Note: Refer to the Foundation's web site, http://www.watereducation.org/Deltavisionworkshops, to view Loren's PowerPoint presentation

Consultant Loren Bottorff encouraged participants to pick up a copy of the draft "Status and Trends Report" on the Delta and said comments are welcome and can be emailed via the Delta Vision webpage at www.Deltavision.ca.gov The final document is planned to be completed in April.

> ***There is unprecedented political and funding support for the Delta and the Suisun Marsh right now but there is no long term funding in place.***
>
> **– Loren Bottorff, Consultant**

He explained that the report is a starting point of the different services in the Delta, the trends into the future and some observations. It's a starting point for the DRMS, the Delta Risk Management Strategy, and other processes. The report discusses nine services from land use to economics. The existing regulatory structure was set up when the Delta was viewed as a static system. Now it's seen as a dynamic system. A remarkable number of agencies deal with the Delta or are interested in the region. There is unprecedented political and funding support for the Delta and the Suisun Marsh right now but there is no long term funding in place.

Drivers of change include introduced species and the population growth around the periphery of the Delta. While the population of the islands and tracts is only 26,000 people, the legal boundaries of the Delta represent a population of 470,000. A total of 3.3 million people make up the population of all the surrounding counties as of the 2000 census. The Delta is primarily agricultural land, but since 1990 as much as 40,000 acres have been converted to other uses. Suisun Marsh is mainly managed wetlands. There are more than 1,300 miles of levees and large areas below sea level. Since 1900 most of the levees have failed more than one time. A total of 166 failures have happened since 1900. Subsidence remains a major problem.

It's a very highly invaded ecosystem dominated by non-native species and the pelagic organisms like the Delta smelt are at an all-time low. The transportation corridors and utilities serve the Delta and large areas outside the Delta. The water quality is affected by upstream discharges and the tides. Urbanization has a big impact and stress on the services in the Delta and marsh. And there is increased risk to the levees from subsidence and sea level rise. •

Robert Twiss, professor emeritus of environmental planning at the University of California, Berkeley, presented a computer-assisted aerial PowerPoint of the Delta using Google Earth.

It's significant that we're meeting in Suisun City because a few years ago a conference on the Delta would not have included the Suisun Marsh. But San Francisco Bay, the marsh and Delta are now considered as a single area. *Showed a map* of the Suisun Marsh Protection Act with the boundaries of the area under various management plans/ jurisdictions. The levees require constant maintenance. They are barely keeping place with storms and tides. This incremental work probably cannot keep pace with sea level rise and other threats.

Showed a map of Suisun Marsh and Delta primary and secondary zones using various layers that showed island boundaries, the legal Delta boundary, primary Delta Protection Commission zone, and a 5-foot contour line to indicate sea level rise and the combined FEMA 100-year and 500-year floodplains. We're sitting in a big tub of floodable land. Even if we can protect key infrastructure or individual islands we need to remember we're part of a larger system. We also need to remember that when they talk about 100-year flooding, they're not talking about the next 100 years. They're talking about the data for the past 100 years. There's nothing in here about sea level rise, climate change or earlier runoff, which we're already experiencing. These GIS maps will be available on the Internet when the final "Status and Trends Report" is released.

Looking at the services, here is the road network. Highways 4, 12 and 160 through the region used to be sleepy country roads but now carry heavy traffic. *Showed map with natural gas pipelines.* These are just the ones that cross the Delta in some matter. Almost all the major supply for northern California runs through the Delta and two thirds of the winter storage of natural gas is on McDonald Island. Power lines run through the Delta as well. Here's the Mokelumne Aqueduct. These islands have flooded in the past. All this vulnerable, important infrastructure is located in an area where levees have failed many times in the past. Almost every island in the Delta and Suisun Marsh has a lot going on as far as infrastructure or land use is concerned. We're sitting in the middle of a megalopolis where these roads are used to connect Sacramento and Stockton and the Bay Area. There is very heavy truck traffic.

Showed a barge piling rocks on a levee road. Rock from a San Rafael quarry is the main levee repair technology. While that work helps protect against wave damage, it adds rocks to the top of fairly unstable systems. Most people think levees fail from overtopping, but structural problems and seepage under the levee make up more than half of such problems. Overtopping is easy to recognize and fix but is not the main problem.

Showed natural gas fields. The DRMS goes to some length to try to determine the vulnerability of these infrastructure components for the infrastructure. If a well were capped, for example, it might be able to withstand some inundation for some time. Some power lines have old footings and don't handle inundation. Newer ones are designed to withstand flooding. *Showed the Mokelumne Aqueduct and the railroad*. One of the few places with two pieces of infrastructure side by side. The railroad is expected to get busier in the future with more port traffic.

Showed the city of Tracy. The "Status and Trends Report" discusses urbanization and the layers of protection for acreage that may be developed that is not in the primary zone. Many of these areas are below sea level. Counties and cities are not giving away building permits willy nilly; these are long-planned developments. But they still hold a big impact for the Delta.

> ***If we wait too long these social changes will foreclose options as will climate change, sea level rise, subsidence and seismic concerns.***
>
> **– Robert Twiss, University of California, Berkeley**

Showed the San Joaquin River at the bottom of the Delta. These are the old meander channels of the natural floodplain. As you get to the edges of the Delta, sea level is not the controlling factor. This is where you would put in a flood bypass to protect Stockton and Lathrop. A flood bypass project akin to the Yolo Bypass near Davis – regarded worldwide as a great engineering solution – is made more difficult by proposed Delta developments – including one already under construction.

Showed area of the old right of way for the Peripheral Canal. The state has acquired the right of way for the original Peripheral Canal but the property now is the site of development including a golf course. A smaller canal still could be built so it's not precluding that option but it does show that urbanization reduces the options available to resource managers in water, agriculture and other uses of the Delta. And if we wait too long these social changes will foreclose options as will climate change, sea level rise, subsidence and seismic concerns. •

Drivers of Change

Marci Coglianese, co-chair of the Delta Risk Management Strategy, opened by saying how thrilled she was to see so many people from the Delta and Suisun Marsh in attendance. She said she is asked to speak many places about the Delta and that many people have never been to the Delta and don't even know what a levee is. Even though local people know a lot about our wonderful region I found Bob Twiss' birds eye view to be a phenomenal addition to my knowledge. It's hard, driving on top of those levees, to get an appreciation of the levees. The best way to get a context of the levees is to get into Jeff Hart's boat. And even though I've lived in the Delta almost 40 years, I've learned so much. We have all kinds of resources to educate even those of us who think we know a lot.

The Delta is in the headlines. A lot. It's a big change from when I had to explain to people where it was; if they knew where it was they thought it was an unimportant backwater of some kind. But now it has both statewide and national attention. You've heard about these drives of changes; they are the potential for earthquake, increasing flood flows, seepage and subsidence, and the big deal breaker – climate change. All of these factors are at play in defining the risks for failure – or even catastrophic failure – of our levee system.

I'm here to talk in layman's terms about a highly complex scientific and technical study that will evaluate that risk caused by these multiple drivers. The study is called the Delta Risk Management Strategy or DRMS. Sometimes I forget to include the Suisun Marsh in all of this but the new, enlightened view is that the Suisun Marsh is intimately connected to the Delta and that we have to look at both of them in context to understand the risks and options for mitigating that risk.

There are four key questions the DRMS study is being asked to address:

1. How great is the risk? How high is the probability of Delta levee failure?
2. How much does each of these hazards or risk factors or drivers of change contribute to that risk?
3. What are the consequences to each of the assets and values – personal property, life, infrastructure and water supply – if in the fact the levees fail?

The last couple of years, all the talk about the Delta was about water and ecosystem. They were not informed by the reality that the Delta is a lot more than that. As people became concerned about a trend toward the Delta is in serious trouble, they were not realizing that the options for

Marci Coglianese, DRMS

addressing those challenges might be more complicated than they thought. Because they were unaware that people lived out here and that there is a vast array of crisscrossing infrastructure also protected by the levee system.

4. What are the best strategies or ways we might be able to reduce the risk?

The boogeyman is the specter of the potential for catastrophic risk of these levees where rather than a historic failure of one or two levees at a time, there would be some sort of cascading chain of failures leading to long-term outages of the water supply, and irretrievable losses to the ecosystem and other assets.

These are the four questions we are trying to answer. If you don't think that's tough enough, think about trying to do that projecting forward in time 50, 100 and 200 years from now. That would require an enormous crystal ball. What are the trends and how might we begin to measure those risks over time would require you to factor in climate change, changing hydrology, precipitation patterns, rising sea level and how that might interact with our levee system. It also requires you to consider the land use patterns because when we think about risk it's both the level of probability of failure plus the consequences of that failure. For example, if a levee failed on an uninhabited island with fairly low value pasture and no infrastructure,

it would have fairly minor consequences. But if levee near downtown Sacramento failed, there would be billions of dollars of consequences. These factors interact in discussion of risk.

Why DRMS? Who is doing it? Can we trust them? URS consulting firm is the contractor working on the study with DWR, the U.S. Army Corps of Engineers and the Department of Fish and Game. URS also has 23 sub-consultants and experts from the science and technical fields. There also is a technical advisory committee of scientific experts, agency folks and three stakeholder/public representatives. I serve as the co-chair.

DRMS is meeting several requirements, including the CALFED Record of Decision, which required a Delta levee risk management strategy regarding mainly seismic risk. But that study didn't get off the ground until now; now it is in full swing and folded into DRMS. Another major driver is AB 1200 by Laird. It requires DWR and DFG to evaluate the potential future impacts to the Delta-derived water supply that serves at least a portion of two-thirds of the population and is a key factor in the state economy, and to rate potential options for the Delta based on criteria in the law. DRMS also will inform the Delta Vision process that's now underway to come up with a plan for a sustainable Delta that can survive these drivers of change.

> ***In my experience as an advocate for the levee system, we were the Rodney Dangerfield of the CALFED process.***
>
> **– Marci Coglianese, DRMS**

My role as a stakeholder is to represent the public. So much has been going on there has been no opportunity for a public workshop. We need to look at the public information available on this study because it will influence outcomes as we re-design the Delta because it will provide parameters for what is possible. Bob presented the slide showing the old right-of-way for the Peripheral Canal; it brings the reality test to the discussion of the Peripheral Canal – which wasn't to be said a year ago without sucking all the oxygen out of the room.

DRMS has two phases. Phase one is to quantify the risks and the consequences of levee failure. A public review draft will be available in mid-April. It will be available on the DRMS web site for your comments. Phase two will develop risk reduction strategies to manage this risk. A public draft is due in September. The final report is due Jan. 1, 2008; the same time the report from the Delta Vision Blue Ribbon Task Force will be presented.

At my urging, an independent review panel of scientists was formed to review these interim products and get interim feedback. It also will be reviewed by the CALFED science board. This gives us some assurance of good, sound science. I encourage you to get involved.

My final comments and caveats for DRMS. To be good consumers we need to be aware of the constraints it is under. The report is to be produced in just 18 months. No new data or studies were obtained for the report. It will be formed with existing information and data. A new survey of Delta topography will not be done in time for DRMS. We are using 20-year-old elevation maps. Very little is known about the Delta earthquake faults in comparison to the Bay Area faults, but they may be key drivers of change. We have asked the consultants to identify data gaps and other recommended studies.

On the plus side, DRMS is the first time that so much information about the Delta has been integrated in a comprehensive fashion. It will provide valuable, objective information to help the Delta Blue Ribbon strategic plan. We need a continuing investment in such studies and science. These drivers of change make the cost of failure to California too high to take their eye off the ball. The work in DRMS needs to be continued. One good recommendation in the PPIC report is that we really need an R and D think tank devoted to the Delta. Right now it is very fragmented across agencies. We run a great risk that the headline grabbing [issue] gets resolved in some fashion and we turn our back on it again. In my experience as an advocate for the levee system, we were the Rodney Dangerfield of the CALFED process and we got no respect until the state realized it might somehow be liable [for a levee break]. Then we had the Jones Tract failure. And then Hurricane Katrina. This is now at the front of the stage and the Delta people need to be involved in the process because if you're not, the other voices will predominate. •

Note: Refer to the Foundation's web site http://www.watereducation.org/Deltavisionworkshops to view Phil's PowerPoint presentation

Philip Duffy opened by noting that this session is on the drivers of change and climate change is certainly one of the drivers of change. This presentation provides background information on aspects relevant to California and the Delta. Let me show you how we interpret those changes and what is causing them and then discuss future predictions. You will see some uncertainties and what we can do to try to reduce them.

Started PowerPoint presentation. One of the major underlying trends is warming. California is warming. One of the consequences of warming is a reduction in snow. Most areas in the West will have less snow. In the south Sierra there will be more snow. The reason is that those are the highest elevation regions in the Sierra and the snow is invulnerable to the relatively minor amount of melting we've had so far.

Trends in precipitation. For the most part, the reductions in snow cannot be associated with reductions in precipitation. One of the very, very important consequences of warming and of less snow on the ground is changes in the hydrologic cycle. One of the primary changes we already are observing is in the seasonal timing of river flows. On many of the rivers that drain the west side of the Sierra Nevada, maximum river flows occur at the end of the rainy season due to the melting of the snow. As it warms and there is less snow, we expect the high runoff to occur much earlier because there will be reduced snow and more rain, which will run off immediately. What we are already seeing is more winter time runoff and less runoff in the late spring and early summer. It's a problem with water supply because we like the late season runoff because it keeps the reservoirs full. It's also a problem with increased flood risk. Projecting into the future we're expecting very high wintertime river flows. We have seen changes in the trends in the center timing, a measure of seasonal flow on each river; the date at which half the annual flow goes by a given measurement point. Data show that on many rivers in the West, especially those fed by snow, that the center timing date has shifted earlier by a significant amount.

Sea level rise is particularly relevant to the Delta. Sea level rise has a couple of components. One is this slow historical increase due to thermal expansion of the sea water. As the water warms it expands. The other potential source is actual additions of water mass, due to melting of snow. There also are short-time fluctuations in sea level due to tides, weather and climate conditions.

Philip Duffy, Director, University of California Institute for Research on Climate Change and its Societal Impacts and Adjunct Associate Professor, School of Natural Sciences, University of California, Merced

Showed photo of Greenland. It turns out that Greenland is very relevant to the future of the Delta because one of the big uncertainties regarding future sea level rise is what's going to happen to Greenland. Is there going to be significant warming? To give you a sense of the scale of things, the amount of ice on Greenland, if it all melted, is enough to cause the sea level to rise seven meters – 20-plus feet if all of Greenland melted. That's calamitous and I'm not suggesting it will happen any time soon, but there is evidence that Greenland is starting to melt. The rate of melting translates to a sea level rise of less than a millimeter a year. That is not significant, but the process is starting and if it accelerates it could be bad. Seismometers on Greenland measure ice quakes, large scale motions of the ice. Data show that the frequency of these ice "quakes" is increasing and this indicates the ice sheet is starting to

move. Nobody has a clue how rapidly it will progress. That introduces a large uncertainty in predictions of sea level rise.

Showed cartoon that says "I don't know anything about global warming, but these ice cubes are melting like crazy." This raises the point that just because we see a warming trend does not necessarily mean it is due to human activity. Climate changes all the time. But we think most of the trends we seeing are due to human activity; that the rate of warming is too rapid to be just from natural causes.

My job is to run computer models to make predictions of future climate. We recognize we have a murky crystal ball and that there are a lot of uncertainties. The field is trying to do the best we can estimating what those uncertainties are. That makes life hard for the planners. It's much easier for them if we say this "is what's going to happen." But all we can say is "this is a range of possible outcomes" and they have to deal with it.

One source of uncertainty in projections is uncertainty of the rates of future emissions of greenhouse gases. Greenhouse gases emitted by the burning of fossil fuels are the main driver of climate change. Because of that how rapidly climate change proceeds depends on how rapidly greenhouse gases are emitted. And that depends on zillions of decisions made by millions of actors – individuals and corporations and governments. It depends on whether you buy a [Toyota] Prius or a Hummer. It depends on whether India decides to use nuclear power or coal to generate electricity. The rate of future greenhouse gases is not only unknown it's unknowable. It's inherently unpredictable. So we use scenarios to try to predict the future. Some uncertainty results in the inability to understand perfectly how the climate system responds to a given level of greenhouse gases. We agree it will get warmer. The range: the maximum is 10 degrees Fahrenheit by 2100; the minimum is 4 to 5 degrees Fahrenheit by 2100. That will have much less impact.

Precipitation. The big takeaway message is we don't even know if it will get wetter or drier. We need to work hard to decrease that uncertainty. One of the main messages I want you to come away with is as far as climate change in the Delta and changes in the hydrologic cycle, the main driver is warming. It's the loss of snow that is the most consequential. *Showed slide with a projection of snow water content in 2050 to 2069 as a fraction of the historical average.* Where the snow remains is in the high elevation areas; it shows a projected loss of something like half the snow. This is not a relatively minor change in the snow cover.

Projections show an increase in flows from January to March; [for] March, April and May, almost all the models are predicting significantly reduced flows. This is not good. This will mean more water in the winter when we don't need it and don't have the capacity to store it, and there will be less water in the spring and summer when we really need it. There's also an implications for flood risk. *Showed slide from a study regarding the 1997-98 el Niño year, when the Bay Area had 200 percent of its historic precipitation.* The question we asked was what if we have a year like that where it was warmer? *Showed slide of the flows of the Feather River at Oroville*. Model projection is if an el Niño like then… the wintertime flows at Oroville would be twice the historical average and would cause flood risk issues. But what compounds the bad news is that in April, May and June, the flows are less than historical average.

> ***The rate of future greenhouse gases is not only unknown it's unknowable.***
>
> **– Philip Duffy, University of California**

Sea level rise. The takeaway message is that future sea level rise is very difficult to project. The uncertainty seems higher now than a couple of years ago because of the realization that Greenland may be starting to melt; an example of where improved understanding leads to increased uncertainty. We're in the process of realizing that this is more complicated that we thought.

To summarize: We expect warming in all seasons. We would like to be able to make projections of how precipitation is going to change, but we can't do that. But it does seem clear that extreme events in terms of precipitation and temperature will become more frequent. I showed you how there already is less snow and earlier snowmelt, we expect those trends to consider. We expect the change in seasonal flow in rivers to continue. And we're projecting higher sea levels, both the mean and the extremes.

Question from the Audience: Do you notice a sense of urgency on the part of the Legislature?

Duffy: Yes. And I talk to people in the DWR and other state agencies and I think they want to do the right thing. By and large they're accepting that climate change is something they have to factor into their decision processes. The problem is it is not easy and I'm not making it easy for them because I am showing them these projections that have a large range of uncertainty. The challenge for decision makers is to make decisions that make sense no matter what outcome occurs. •

The Delta of Tomorrow: Land Use Trends and Governance

Note: Refer to the Foundation's web site http://www.watereducation.org/Deltavisionworkshops to view William's PowerPoint presentation

William Eisenstein, director of the Delta Initiative for the University of California, Berkeley, reported on the brief, intense workshop held for two days in October 2006. The Delta Initiative seeks to understand land use development and pressures in the Delta and explore alternative futures for the Delta that would improve public safety, secure water supply and infrastructure, reduce state taxpayer liability, and provide habitat, open-space and recreation benefits. It's a vision process referred to as a "charrette" – a French term used in the design world. The event looked at land use and levees in the Delta 50 years in the future and was a pilot project to see if it was a useful tool for helping to develop a Delta vision.

Charrettes are useful for the Delta for four main reasons:

1. The Delta has suffered from an identify crisis. Thousands of people live around it, millions more rely on it, but few have been there or truly understand it.

2. Charrettes produce quick, tangible products. They are not just brainstorming exercises.

3. Charrettes give complex debates a visual form. The Delta is about as complex a debate as you could ever find anywhere.

4. Because charrettes deal with a place they are inherently an integrated approach to problem solving; they don't focus on only one issue.

Nineteen people participated in the October event. Graduate students assisted in the event. The charrette looked at land use, infrastructure and levees but did not look at water conveyance, water quality or aquatic ecosystem issues. We chose to frame the process because it was a pilot effort and we wanted to establish a process for Delta visioning efforts. Also, we believe that land use issues are extremely important but have not received the same attention as water and ecosystem issues. We did not consider agency/governance issues; we looked only at the land and land use.

Eisenstein said the charrette was framed to the participants as the fact that more and more people were relying on a Delta system that was more brittle and vulnerable to

William Eisenstein, UC Berkeley

climate change, earthquake threats and flood threats, and that creating a resilient Delta was important to the region's future. Participants who view the Delta from a statewide as well as a local perspective and experts in levee system management, local government and other issues were selected to participate.

The process attempted to design a land use pattern for the Delta going island by island and dealing with five basic land uses: agriculture, wetlands, recreation and tourism, new urbanization or open water. They worked in small teams to quickly place desired land uses on islands and then worked in a second phase to more clearly articulate their vision of the land use, for example what type of agriculture.

Five infrastructure categories were considered: highways, the Mokelumne Aqueduct, Santa Fe railroad, regional electrical lines and regional gas lines. We had people consider four potential choices for helping to protect a

system from a flood or other disaster: elevating it, armoring it, rerouting it, or creating redundancy in the system.

Participants were given five basic possibilities that teams could consider regarding levee modifications on an island by island basis:

- continuing the status quo, accepting occasional levee failures and repairing them as they failed
- strengthening levees to reduce breaches
- creating vegetated levees to provide for habitat and visual benefits
- dealing with cross island or setback levees
- rebuilding an island to sea level

Eisenstein displayed a series of four PowerPoint slides of maps of the various products with delineation of different types of land uses. The maps, and *The Great Delta Charrette* report, can be accessed at this web site: http://landscape.ced.berkeley.edu/~Delta/charrette/DWR%20report%20final.pdf

Creation of flood bypasses, diversification of farmland to include more wildlife-friendly agriculture, development of additional wetlands, enhanced riparian corridors, bundling of infrastructure for flood protection, use of islands for water/flood storage, conversion of the western Delta islands to terrestrial recreation and ultimately open water recreation post-flood, expanding the Delta trails system to Contra Costa County and creation of a Delta national monument were among suggestions by participants in the four groups at the workshop.

The four visions had some commonalities: no new urbanization in the primary zone, extensive wetland restoration, flood tolerant agriculture, expanding recreational assets and using vegetated setback levees.

The charrette demonstrated the power of spatial visioning for Delta planning. It illustrates that rapid urbanization already is occurring even as participants of this process called for flood bypasses in those same areas. It also makes it clear that the different parts of the Delta need to be managed in different ways. The exercise helped people recognize that the Delta is a place with a culture, landscape history and enormous potential.

Eisenstein said they hope to carry this forward as part of the Delta Vision effort by broadening participation at future charrette exercises to address some of the water-related issues. •

Land Use Panel Discussion

Back Row, L to R:
Mark Wilson, *Vice President, Wilson Vineyards*
Moderator: Mike Connor, *Executive Director, San Francisco Estuary Institute*
Linda Fiack, *Executive Director, Delta Protection Commission*
Alf Brandt, *Principal Consultant, California Assembly Water, Parks and Wildlife Committee*
Kathleen Van Velsor, *Program Manager, Water and Land Use, Association of Bay Area Governments*
William Eisenstein, *Director, The Delta Initiative, University of California, Berkeley*

Front Row, L to R:
John Cain, *Director, Restoration Programs, Natural Heritage Institute*
Toby Wells, *Director of Land Entitlements, Pulte Homes*
Lenora Clark, *Vice Chair, Boating and Waterways Commission and Vice President, Recreational Boaters of California*
Margit Aramburu, *Director, Natural Resources Institute, University of the Pacific*

Moderator Mike Connor: Noted that six of the panelists participated in the charrette and he asked each panelist to provide a short summary of their thoughts on the charrette.

Linda Fiack: It's good to see such a diverse group. It's great everybody is vested in this. Though some of us knew about the Delta's diversity the charrette brought out that it is different regions. There are a lot of different perspectives and opportunity to bring people together for collaboration. It was good for the Delta Protection Commission to have reinforced that land use and habitat need to be considered along with water, and reaffirmed our role in the Delta.

Regional connections are important. Human and social aspects are important, along with scientific aspects of the Delta. It was good to have participants from inside and outside the Delta mesh during the process. Our group identified the need to recognize the Delta's identity. Life is going on while studies of the region are underway. Look at the trail system around legacy towns. "Branding" and

signage so people can become good stewards of the Delta. Our group came up with the monument idea. We wondered how to put in a super levee and not encourage urban development, so we came up with the monument idea. Habitat and recreation corridors. Levee strategies – urban levees are needed around Stockton and Sacramento for 1,000-year protection. We want controlled floodable areas for agriculture for flood control with setback levees with vegetation.

John Cain: Land use issues are a water resource issue in the Delta. Development in the Delta is largely in deep floodplains where you're putting people at risk. We're restraining our ability to manage floods by putting people in these areas. Land use development in the Delta can cause water quality problems. Currently we have problems with salinity and carbon. If we urbanize the areas, all of that runoff will drain into the Delta and rather than two problematic constituents, we may be dealing with a dozen – not only degrading drinking water but also the Delta habitat. Land use also could constrain how upstream reservoirs are operated for flood control and water supply. If more people move into the downstream floodplains, the upstream reservoirs may be under more pressure to set aside more space for flood control – reducing storage capacity for water supply. The Delta presents so much opportunity, but urbanization forecloses the opportunity to respond to future challenges. Urbanization destroys habitat.

> ***Land use issues are a water resource issue in the Delta.***
>
> **– John Cain, NHI**

But where will all the people live? We hear that we need to build in the floodplains to provide affordable housing. But in many cases we're building in these areas because the town next door has a slow growth ordinance. Tracy has lots of land above sea level but they have a slow growth ordinance so the development moves to Lathrop, which has a lot of land in the deep floodplains. We need regional planning. Stockton's downtown could be revitalized, but very little is happening. The Sacramento Area Council of Governments proposes a smart growth footprint to reduce the sprawl and concentrate development. This idea that we have to build in the Delta and we have to build in floodplains … we need to step back and have some regional planning. We need economic development in the Delta. We need to get the proper level of sustainable development inside and outside the Delta.

Mark Wilson: The charrette process was very useful. I'd like to see a broader set of interests at the charrette, but it was a good start. I was in group one and learned a lot from John. Governance is one of the problems we've seen in the past in the Delta and we're likely to see again. A recent situation, the old sugar mill project in Clarksburg, is a very big concern of those of us in agriculture who want agriculture to evolve with the economy. What are the values we place on different aspects of the Delta? Historically, the Delta was developed under the swampland act and to create navigable waterways. Agricultural production was supposed to be on that reclaimed land, the fuel for the economic engine at the time. Today's values are different: the first value is water delivery, then ecosystem and water quality, recreation, urbanization, infrastructure and agriculture. Agriculture takes up the largest area but has the least value to society. If there were no agricultural production in the Delta it wouldn't make much difference at the supermarket but we don't want agriculture in the Delta to become a working museum.

Toby Wells: From the builder perspective, one of the key points I wanted to make is that there's got to be a balance. There are few builders who are interested in building in the primary zone. For the most part the interest is in building in the secondary zone and there are some areas that are more suitable than others. There has to be a balance. People want to live near the Delta and bottom line, from a builder's perspective; if people didn't want to live there we wouldn't build any homes. From our perspective, clear objectives and clear directions makes it easier. The uncertainties of can we build there or not… that creates a tremendous amount of uncertainty and having to meet the affordable housing needs in California… having clear direction helps. Infill and smart growth. We can all do a better job with that, but not everyone wants to live in that urban environment. We're glad to be at the table and we welcome continued input in this. There can be common ground and not spend money challenging the process but making things better.

Lenora Clark: I was not at the original charrette. I look forward to participating in the next one. I represent recreation. We need to bring a human element to all the science, to the urbanization, to all of the concerns we have about creating a sustainable Delta. I also come as someone who has lived in the Delta for the past 20 years in Discovery Bay. Like Toby says, I wanted to live where I can work and play. But I can look across my dock and see the [introduced water weeds] growing profusely and wondering if it is going to choke my boat's exhaust. So I'm concerned [about the Delta] for a lot of reasons. I see a lot of boaters here. We want to continue to enjoy the thousands of miles of boating waterways. We want to do it responsibly and leave it for our children to enjoy. We want to make sure we make the smart choices. The Department of Boating and Waterways' mission is to provide access to the state's waterways for boaters. But a lot of people who make decisions about the Delta have never seen it or lived here.

Alf Brandt: I'm representing Assemblymember Lois Wolk, who chairs the Water, Parks and Wildlife Committee and represents much of the Delta, including Suisun City.

The Delta has been a central part of her life since her service on the Davis City Council. She participated in a press conference yesterday announcing UC Berkeley's report on the Delta. She sponsored and chaired a joint Senate-Assembly Delta hearing yesterday where she emphasized the biggest crisis is leadership. We need leadership. With many cities, five counties and 26 state and federal agencies involved in the Delta, it's a huge challenge. No one is accountable and can make the decision to move forward. Land use, as was illustrated in the charrette, is a perfect example with all these cities and counties making decisions one by one. Leadership is the key to a successful vision. We hope to see the governor personally involved in the Delta Vision process. But she sees that the dysfunction in emphasizing process can benefit some because it leads to gridlock and us not making a decision. …

Now is the time to make sure we're asking the right questions and part of that is the land use. The focus on Delta land use during the charrette is an important message. The next step is to combine land use and water as a subject for review. For a long time some issues – including land use – were taboo when talking about the Delta. We've got to have everything on the table. …

Kathleen Van Velsor: I was pleased to participate in the charrette. A lot of productive work was done. My role was to bring information and interest about some things ABAG [the Association of Bay Area Governments] is doing relative to the Delta. I did bring my agency's interest in water and land use planning to the charrette. ABAG has a keen interest in the condition of the infrastructure and what is going to happen to it over time and how we plan for it and around it. Port facilities are another key part of our infrastructure and some of the wastewater treatment plants that need to be considered in the process. ABAG is hosting some Bay Delta levee technical workgroups.

We want to emphasize that we don't see the Bay and Delta as separate so one of the comments I did make during the charrette was to focus a little bit of attention on the Suisun Marsh and on flood attenuation. ABAG also talks about a system approach – a watershed approach and incorporate all of the issues that have a possible impact. The Delta is part of a very large system. Land use is an issue to look at regionally, not just in the Delta and its perimeter. We do see the need for an inter-regional approach. We see that as a way to address urbanization and agricultural preservation. ABAG is not unaware that agricultural interests and values are very strong in the Delta. We'd like to see a multi-agency approach to the Delta remain intact, even though we've seen the CALFED process shred a bit. We need to look at the big picture – at the contributing factors in the north and south portions of the Central Valley and even the foothills.

Margit Aramburu: I was in group three. Our charrette really wanted to recognize and celebrate the uniqueness, history and beauty of the Delta. Don't undo what's already done. Don't unring the bell. Protect the uniqueness of the region. Retain the economic base in agriculture and the stewardship that goes along with private agriculture. Those people are the ones who walk the levees and help monitor the levees. We want to enhance and protect the larger values society recognizes, including habitat and recreation. But we were constrained because we were to focus on land use. But we discussed protecting agriculture in relation to some of the larger issues such as growing habitat, growing carbon, completing wildlife corridors and recreation trails. We have a history of recreation in the Delta with private and public investments – marinas, parks and trails. We have new opportunities for agro-tourism and eco-tourism. We have our unique legacy towns and unique history and cultural identity of the Delta that we want protected and opened to a larger public. And we have this infrastructure with the gas pipelines and roadways. We already invested all this money. Our group did not think we needed to pull them outside the Delta but protect what was there. So we talked about levees, whether you could do habitat levees, better levees for urban areas.

> ***We don't want agriculture in the Delta to become a working museum.***
>
> **– Mark Wilson, Wilson Vineyards**

The next charrette and the Delta Visioning process should address who asks or frames the questions about the region beyond land use. Who will be invited to participate in the Delta vision? Who listens? Who will hear what the process delivers? Is it the state, the legislature, the governor, or a consortium of state and federal agencies?

Question from the Audience: I'm concerned that maps one and three showed the San Joaquin River closed off east of the Antioch Bridge with Cadillac levees. That's a major boating area. What's going to happen there?

Aramburu: The maps have been simplified. The concept of a Cadillac levee was how can you most effectively protect the most vulnerable parts of the Delta beyond just protecting urban areas? Can we evaluate levees that protect water quality and the Delta as a whole? There was no intent by any of the members of the group to eliminate the ports, the recreational activities, etc. That was not the point. We just were trying to be creative with thoughts of how we could protect the Delta.

Cain: I was in group one. We weren't talking about building levees across rivers. I think that's a misunderstanding.

Fiack: I wanted to add that one of the conclusions that came out of the process was that these maps should not be

considered the guiding document. These maps are a place to start.

Clark: I want to say that there are some plans with CALFED right now for some gates and locks to be placed in and around navigable waterways in the Delta and RBOC is going to be sitting down at that table to discuss those issues and discuss some possible mitigation so boaters will not be impacted.

Question from the Audience: I'm a little confused about the statement "let's protect the infrastructure and move on."

Aramburu: Some of the things we talked about were: should we reroute all of the state highways, the water conveyance facilities, the gas pipes and electric transmission lines outside of the Delta, or make it work. Our group decided to see if there was a cost effective way to protect the investment we've already made rather than move them.

Comment from the Audience: A resident of Bethel Island discussed the island's threat from development and the need for more engineering studies.

Cain: Thanked the woman for her leadership. And said he would help them in their effort.

The kind of development we're seeing in the Delta is homes to be built in areas that were under water in previous floods. The legislators are not doing anything because of the building industry even though we all saw the photos of Katrina. It's up to the building industry to determine whether it wants to put thousands of homes behind [inadequate] levees with sea level rise.

Fiack: We have the urbanization line regarding the primary and secondary zone. Many of the areas being developed are in the secondary zone, but probably should face greater scrutiny based on their topography and geography. That's what I think this visioning process should do.

Question from the Audience: Directing the question to Toby Wells and Kathleen Van Velsor. It seems like what we're talking about is the pent up Bay Area demand for housing because of the relative low cost of housing. Can you direct me to examples or guidelines that your industry employs to develop existing areas such as downtown or development of higher density areas to reduce sprawl?

Van Velsor: ABAG is joining with other regional organizations and agencies in Focusing Our Vision to do what you just discussed. Asking communities to consider what they might look like if more compact, more transit friendly and emphasis on open space and recreational land. To promote a city-center approach throughout the region – ABAG consists of 101 cities in nine counties.

Wells: The building industry is directed by city or regional [development] plans. The interest in smart growth depends on the location. Not every area has the same vision when it comes to such things as redeveloping downtowns. Economics also plays a role the cost of land and the yield of units on that land.

Fiack: The Delta Protection Commission has a management plan incorporated in the [Delta's] five county general plans but the problem is in some plans it's only a one line reference so we are trying to work with the counties to let them know that they do have the Delta in their county. We've also been meeting with them to discuss having a Delta element in their general plan to encourage stewardship.

Comment from the Audience: One of the great frustrations for Delta residents is having their voice heard. I encourage the group to have a charrette in the Delta.

Clark: One of the reasons we were [recently selected to the] Delta Vision Stakeholder Coordinator Group is that we not only have our own constituency but that we make contact with the people who have concerns as we meet with people.

Question from the Audience: What considerations have you given to preserving lifestyle recreation such as hunting and fishing?

Aramburu: My group and I understand that one of the unique recreational values in the Delta is the legacy hunting and fishing.

Cain: We included it in our charrette as one of five critical uses.

Question from the Audience: As we grapple with development and balancing agricultural needs, my concern is about emergency preparedness. And if we go the direction of any kind of urbanization, what discussions have been held with fire safety and other issues beyond flooding?

Brandt: That's an evolving issue, thanks in large part to the counties coming together and discussing this issue and helping to develop a plan to address these issues. The issue hasn't received the attention it deserves.

Fiack: In the past the emphasis was on the technical aspects of flooding. But the [Delta Protection] Commission held a summit last June to discuss not only individual county's plans but how the counties can work together. All five counties are now signing onto an official plan to create a Delta-wide emergency response [plan].

Cain: I applaud this effort but we really don't have a plan worked out yet and we still have cities permitting thousands of new homes in deep floodplains. Start with land use if you want to prepare for an emergency. •

Suisun City Mayor Welcomes Participants

Suisun City Mayor Pete Sanchez thanked the Foundation for sponsoring the event and the Resources Agency for funding it. We need more efficient management of our water system. We now have more information about the condition of our levee system. We can never forget the lessons of Katrina. We must address the unmet needs of the Delta. We need to recognize that the Delta's urbanization poses great danger to the fish population. We have to think of faster and better ways for distribution of water. We face enormous challenges and we must be serious about starting discussions now. I'm encouraged to see experts at the workshop. It's an enormous undertaking to shift from just supplying water to the other tasks of studying land use, developing infrastructure, supporting recreation. Implementation of sound policies to avoid flooding, construction of storage and establishment of a distribution system require a firm resolve, a steady mind, and lots and lots of money. •

How do Current Trends and Emerging Risks Affect Your Vision for a Sustainable Delta?

Greg Bourne, Managing Senior Mediator, Center for Collaborative Policy, introduced himself and explained the process for the lunchtime breakout groups. Participants were previously assigned to different tables, with each table composed of people from various interests. Each table was to select a recorder to record the conversation and a reporter to report-out after lunch. He encouraged robust conversation among participants as they considered three questions developed by the Center for Collaborative Policy related to the Delta Vision.

Each table was asked to address these three topics/ questions:

1. Review the list of "trends" from the "Status and Trends Report" and discuss which you believe are most likely to threaten your vision for the future of the Delta.

2. From the "Status and Trends Report," the discussion of drivers of change and other recent reports on the Delta, what assumptions about the future of the Delta do you question, and why?

3. There is significant emerging concern about land use trends in and around the Delta and their potential impact on the future of the Delta. What do you see as the major land use concerns (if any), and as possible solutions to those concerns?

The Foundation provided the written reports to the Center and state officials for inclusion in the development of the Delta Vision. The oral report-outs as well as the written reports are included in the written summary proceedings.

Current Trends and Emerging Risks: Breakout Group Reports

Following the lunchtime breakout group sessions, the workshop reconvened. Greg Bourne explained the process of reporting on each group's discussions. For each question, representatives from the various groups were asked to outline two to three key points, with subsequent speakers/representatives adding on new and/or different thoughts and perspectives. (Note: see Appendix A, page 33, for the written reports from the various groups.)

Greg also provided an update on Delta Vision. Legislation and the Governor's executive order signed in September 2006 initiated the Delta Vision Process, which is designed to build on work done through CALFED, but encompass the Delta's full array of infrastructure and land-use resources. Delta Vision will identify a strategy for managing the Sacramento-San Joaquin Delta as a sustainable ecosystem that can support its environmental and economic functions.

A Delta Vision committee of the five related state agencies has been established by the California Resources Agency. A Blue Ribbon Task Force chaired by former state legislator Phil Isenberg was appointed by the Governor along with a 42-member stakeholder coordination group. He pointed out that seven members of the coordination group were at the workshop. The Blue Ribbon Task Force first met in March and will meet again sometime in April. The stakeholder coordination group had met March 5-6 and was scheduled to meet again April 3-4.

A final Delta Vision report with recommendations from the task force is due Jan. 1, 2008. A task force Delta strategic plan is to be submitted to the public and the Delta Vision committee by Oct. 31, 2008 and a report is to be submitted by the committee to the governor and Legislature by Dec. 31, 2008.

In addition to the Foundation's Delta Vision workshops, the Center for Collaborative Policy will be conducting regional public meetings. The Center already has completed a stakeholder interview process in which 80 stakeholders were interviewed to ascertain feedback on issues related to the Delta Vision; the information was published in a "Delta Vision Stakeholder Assessment Summary" released in February.

Review the list of "trends" from the "Status and Trends Report" and discuss which you believe are most likely to threaten your vision for the future of the Delta.

Answers:

- Northern bypass
- Salinity
- Flood water
- Lack of common sense decisions
- Political indecision
- Lack of acceptance of public input
- The need to educate people
- Urbanization – the continuing expansion without needed infrastructure
- Global warming
- Seismic concerns
- Introduced species
- Urbanization
- Sea level rise
- Soil redistribution – subsidence
- Major earthquake
- Population growth
- Affordable housing
- Don't believe that seismic issues are a concern in a Delta; little to no evidence of major historical problems
- Important to make sure that Suisun Marsh be considered part of the Delta vision
- Burrowing animals in the levees
- Concerned that the statement that the Delta is not sustainable in its current form is being translated into that the Delta is not sustainable in any form; runs the risk of becoming the conventional wisdom
- Lack of regional and local planning
- Question of sustainability – should not be considered an all or nothing thing
- Urbanization should be controlled by a central area
- Salinity
- Sea level rise
- Increased movement of water south
- Stakeholder group size and diversity – ability to bring people in and move forward with a plan that is politically acceptable is a threat.
- It's a threat in the face of weak leadership; strong leadership can prioritize things at different levels.
- Urbanization can lead to other problems we can't control; once it's urbanized there's no going back.

From the "Status and Trends Report," the discussion of drivers of change and other recent reports on the Delta, what assumptions about the future of the Delta do you question, and why?

Answers:

- The idea that the Delta is expendable
- Can the Delta sustain any urban population growth at all?
- Up to at what point should the Delta be sustained?
- Salinity – is the Delta "fresh" or not? What was it like historically?
- All agree it will be population growth, respectfully question that there will be unregulated population growth and urbanization in the Delta. Our group firmly supports a slow growth, regional plan.
- Invasive species – agree that they're an issue, but think it is going to be a huge, huge issue.
- Level of seismic risk – scientific community is not with one voice on that. Need to resolve that as much as possible before you begin building other things upon those ideas.
- Subsidence and the idea that it might stop subsiding

There is significant emerging concern about land use trends in and around the Delta and their potential impact on the future of the Delta. What do you see as the major land use concerns (if any), and as possible solutions to those concerns?

Answers:

- Development, building houses too close to levees
- Check development
- Create a balance between open space and affordable housing
- Urbanization in deep floodplains – solution "just say no."
- Urbanization – inability to find good places for development and better process for identifying areas appropriate for development
- Public safety – condition of the highways and the lack of infrastructure with respect to public safety
- Urbanization – many of the trends raised as concerns could likely be addressed with additional focus on strengthening the levees and providing more storage north, south and in the Delta
- Help make it easier for infill development and help with the liability issues – subsidizing levee development and levee strengthening in areas already urbanized
- Flood control, ecosystem and water management – can we make all these things work together?
- Is it worth letting an island go? We question if this "do not resuscitate" list will ever exist. Jones Tract recovery costs not in line with the economics/value of the island itself
- Prioritizing agriculture – implementation; the visible line we talked about earlier is real, it is the regulatory boundary. Need another structure such as a COG to address these issues and cross those lines
- Agriculture – is the agricultural community using the Delta for the best benefit? Are they putting in crops that helps keep the land built up?
- Urbanization is a concern, but it is inevitable. Maybe think about smart land use decisions. •

Envisioning Futures for the Sacramento-San Joaquin Delta

Note: Refer to the Foundation's web site http://www.watereducation.org/Deltavisionworkshops to view the PPIC PowerPoint presentation

Jay Lund, UC Davis, and Ellen Hanak, Public Policy Institute of California.

Ellen Hanak, research fellow for the Public Policy Institute of California and co-author of the *Envisioning Futures for the Sacramento-San Joaquin Delta* report, noted that there were four other authors in addition to herself and Jay Lund. The team combined a number of different specialties such as engineering, geology and fisheries biology. She explained that the PPIC is a nonprofit, nonpartisan think tank dedicated to conducting non-advocacy work related to policy making in California.

Started PowerPoint presentation. The report's aim was to assess Delta problems and look forward to what alternative futures might be more sustainable than the situation that we're in. In addition to conducting research, the team had conversations with experts and stakeholders on specific topics. Some of the major themes/key conclusions – number one, the current way we're managing the Delta is unsustainable for almost all users. The second theme is there is improved understanding of the Delta, particularly the ecosystem problems. The third message is that there are promising alternatives. Make a distinction between the problems and some of the unsustainability of current issues, that that doesn't mean the Delta should be written off. There are a number of promising alternatives.

The fourth key message is there's a lot of ability for human users of the Delta to adapt. We'll be forced to adapt just because the forces of nature will make us change. Fifth, we don't think that promising solutions will arise from a stakeholder-only process. Stakeholders are very important but it's our sense that the CALFED theme of "everybody gets better together" … there's going to be the need for

some tradeoffs. Not everybody is going to get what they want out of the Delta of the future so there is a need for strong political leadership to negotiate these tradeoffs. It's also important to have a strong technical process to accompany the policy process.

Some of the new thinking stems from how we manage water in the Delta. California policy since the 1920s has been to keep the Delta with as much fresh water as possible. Salinity coming into the Delta was harmful for Delta agriculture and urban areas drawing water right out of the Delta. It was also viewed as a problem for the planned export of water out of the Sacramento Valley to the San Joaquin Valley. Debates occurred over whether a dam should be built across the Delta to keep out salt water – but plans for an upstream hydraulic barrier prevailed, sending water from the north from Shasta Dam to provide water to the pumps and the exporters and also using the water to keep the western part of the Delta as fresh as possible.

Not everybody is going to get what they want out of the Delta of the future so there is a need for strong political leadership to negotiate these tradeoffs.

– Ellen Hanak, PPIC

A combination of limited records and anecdotal information suggest there was a lot more fluctuation in water salinity before the water projects. C and H Sugar Factory was built when there wasn't a connection to fresh water and they used barges to get fresh water out of the Sacramento River. You had a lot of variation between summer and winter. In the 1920s it was a dry period and there was more diversion of water upstream and they ultimately got their fresh water from Marin.

Our interest is thinking about how to exploit this information to figure out how to better manage such things as invasive species. The way the Delta is now managed keeps salt water out but that doesn't benefit native species, such as the pelagic species. Alien species, such as the Brazilian water weed and Asian clam, have taken hold. The overbite clam does well in brackish water and has invaded Suisun Bay. Research shows that if you expose these aliens to more variable conditions it can help to control and even kill them and help the native species compete.

New thinking about economic adaptation. The CALFED approach has had an assumption that you have to work with what you have at the moment and a fear or even impossibility of adapting. We talked to stakeholders and found that many are adjusting and anticipating change.

We also used some modeling tools to estimate cost. We developed a new Delta agricultural production model which allows you to estimate what the current profitability and revenues are in particular areas and what would happen with increased salinity in relation to revenue changes and crop shifts. One thing that surprised us is that the westernmost Delta would be subject to more fluctuations in water quality already is the least profitable agriculture in the Delta. Salinity increases would impact Delta agriculture, but not uniformly so. Large areas are unlikely to be affected. Looking at statewide effects, the CALVIN model shows that if the pumps were completely shut down and exports ended, it would disproportionally impact agriculture in the San Joaquin Valley, particularly the west side. A different kind of policy experiment if you reduce exports but don't shut off the connection, there is more widely shared effects of the risk and cost mainly because of the possibility of trading water among users. A lot of users have the ability to adapt to changes in the Delta. Overall the economic costs are finite but can be very important for certain users and would have to be considered in any mitigation strategy. •

Jay Lund, professor of civil and environmental engineering at the University of California, Davis and co-author of *Envisioning Futures for the Sacramento-San Joaquin Delta*, said we wanted to do a little more than say we have all these problems and all this new thinking. We wanted to see the implications for some fairly broad alternatives in the long term management of the Delta. We're not going to solve everybody's problems. We don't expect everyone to agree with us.

We had nine broad alternatives:
- Three looked at a continued fresh water Delta, two based around levees, one around a salt water barrier;
- Three fluctuating Delta alternatives, two based on different variations of the Peripheral Canal and one through Delta conveyance;
- And three with reduced export alternatives: opportunistic Delta, eco-Delta and abandoned Delta.

Began series of PowerPoint slides.

1. Levees as usual, the current policy with a little more enhancement. We see it as having increasing risk of failure over time because of subsidence, earthquakes or sea level rise. It's a worsening situation.

2. The "Fortress Delta" option is discussed as a Dutch perspective. You pick some islands to be serious about protecting to a Dutch standard. Their country is almost entirely a Delta and their lowest level of protection is 1,250 years. For their big urban areas it's 10,000 years. Many islands, however, would lose protection.

3. Sea water barrier. Back in the 1920s and 1930s the intense debates about the Delta were whether we should build a dam across the Delta, perhaps at Carquinez Strait, or should we have a hydraulic barrier.

4. The Peripheral Canal option "is not your grandfather's" canal, the project rejected by California voters in 1982. This is a smaller plan. What a Peripheral Canal does for you is break the link between water exports and how you manage the ecosystem. It allows the Delta's salinity to vary.

5. A variant on the Peripheral Canal, the south Delta restoration aqueduct takes water from the Sacramento and instead of leaving it at the intakes of the projects it leaves it in the lower San Joaquin River. It allows you to take care of a lot of water quality problems in the South Delta and Stockton ship channel on its way to the export pumps.

6. The through-Delta armored island aqueduct. Take some channels in the Delta, widen them and put fortification levees alongside so the western Delta can fluctuate but the eastern and southern parts of the Delta stay fresh.

7. Opportunistic Delta. Reduce exports and maybe build some near-pump storage. On the average pump less.

8. Eco-Delta. The operating priority is the ecosystem first and any water exports are incidental. You would have a lot of fluctuations in the exports and a much lower average. For all of our alternatives we see a much more varied Delta. We have had a policy of treating the Delta all the same but we might do better to have some parts of the Delta function in different ways.

9. Abandoned Delta. The idea is you decide not to use it for ecosystem or exports and do not put anymore money into it. All the islands below sea level would ultimately flood; it would be an end of water exports and an end to ecosystem investments.

> ***We're not going to solve everybody's problems. We don't expect everyone to agree with us.***
>
> **– Jay Lund, UC Davis**

We took a quick screening analysis based on ecosystem performance, water exports and rough estimates on economic and financial costs for water scarcity. We know there are a lot of other services the Delta supplies, but we talk about those more in the report. *Showed PowerPoint matrix/slide.*

Ecosystem performance – the report's alternatives involving a freshwater Delta don't perform well, as they haven't for decades. Same for abandoning the Delta.

Water exports – with levees as usual it's good, but over time, you could expect zero [exports] more frequently. Opportunistic and eco-Delta show more fluctuation; abandoning the Delta means no more exports.

Economic and financial costs – very rough estimates for capital costs, probably at least two times more money. The failures in the Delta DRMS $10 to 40 billion per failure. Water scarcity costs also probably low by a factor of two.

Of the nine alternatives, they found four to be unpromising: levees as usual, fortress Delta, sea water barrier and abandoned Delta.

Recommendations:
- Focus on promising alternatives
- Create technical track to explore solutions with problem-solving research and development
- Enhance regional and statewide representation in Delta land use decisions (e.g. San Francisco BCDC)
- Implement "beneficiaries pay" financing
- Establish mitigation mechanisms – everyone will not "get better together"

Short term recommendations include emergency preparedness. But we think there needs to be a "do not resuscitate" list for some islands. This is useful for maintaining reasonableness for state investment of tax dollars in saving an island. It sends a new message in our discussion: that we're going to make a commitment to changes in how we manage this system. There are places in Suisun Marsh and Cache Slough for environmental restoration in the short term.

Comment from the Audience: Conference attendee Jeff Hart said the argument about salt in the Delta has been carried too far. Historically the Delta was kept fresh by all the water stored on the islands. When you showed those pictures of the salt beginning in the teens and the '20s, that was after all the levees were constructed around the islands; those islands once served as reservoirs of fresh water fed by flooding and river water. While salt water might tend to intrude during droughts and in late summer, fresh water was still washing out of the islands would have countered that. The kinds of plants on the Delta islands are very different from the brackish and salt water depending plants in Suisun Marsh. Third, the oldest historic map that goes back to 1833 shows distribution of some plants that did not tolerate salt. There was a time between when the islands were leveed off and before the dams were constructed that you had the most salt water come into the Delta.

Lund: That's good point. There's a lot of uncertainty as to how far, how frequent and at what concentrations and over what area there were salinity fluctuations. What we're seeing is that a lot of the species in the Delta seem to do better with fluctuations. More fluctuations were there naturally – extending to Suisun Marsh – than we're seeing today. It appears to be promising as a strategy that variability is quite important to the ecological system. … As a policy matter, if you decide to go that direction, you would then need to determine where and when you would have that fluctuation in today's system.

Question from the Audience: I've heard about the "do not resuscitate" list and some people think you mean to give up on that island. As I read it, it seems to me you're saying if that island floods, you just don't use society's tax money to "resuscitate" it.

Lund: We need to be a little more thoughtful about the future of some of these islands. You're not going to be able to keep all of them the same way they are today. Some you might be able to raise the elevation; some you might not be able to do anything with. Some you might be able to shore up the levees. You might end up with several lists of what you want to do in the future. The point is to get people to start thinking about how we might want to change in the future.

Question from the Audience: How realistic is it to have a Dutch-type flood protection scenario or armored levees given that the Dutch don't face the same seismic risks? [Editor's Note: the "fortress Delta" is not one of the PPIC's recommended plans.]

Lund: You see what we thought of the Dutch fortress Delta. We didn't think it was promising. For the upstream flood control it makes more sense because you're not looking at failure from seismic as much as from floods. One thing I like about this report is that the conclusions are quite robust. We think the weakest scientific pillar of this report is the fluctuating Delta in terms of how much, how often. But if you don't believe that at all, you still have to change the Delta for seismic reasons. •

Response Panel: The Politics and Science of the PPIC Report

Back row, L to R:
Moderator: Tom Philp, *Associate Editor, The Sacramento Bee*
Greg Gartrell, *Assistant General Manager, Contra Costa Water District*
Steve Chappell, *Executive Director, Suisun Resource Conservation District*
Barbara Barrigan-Parrilla, *Campaign Director, Restore the Delta*
Marci Coglianese, *Co-chair, The Delta Risk Management Strategy*

Front row, L to R:
Tim Quinn, *Vice President, State Water Project Resources, MWD of Southern California*
Barry Nelson, *Senior Policy Analyst, Natural Resources Defense Council*

Moderator Tom Philp: Asked each panelist to provide some feedback on the PPIC report.

Greg Gartrell: Recommended reading the report, saying that it is a very valuable addition to the state of knowledge about the Delta. Said he wanted to correct one thing Ellen said: the policy of the CVP and SWP has not been to make the Delta as fresh as possible. The state Supreme Court in the 1920s in the Antioch decision said the policy of the state was to encourage the use of water for irrigation of the lands of the state and forbid wasting water. The city of Antioch was suing upstream diverters because the Delta was getting so salty they could no longer divert water they had diverted since the 1870s. The Supreme Court told them to "go pound sand." The state policy was to use as much water as possible and the mechanism they chose was to put in dams upstream and irrigate the lands in the Sacramento and San Joaquin valleys and at the same time keep the Delta not as fresh as possible, but as salty as they could get away with. It is not too much different than today, but [PPIC] is correct that it is less fluctuating than it used to be. It's a lot saltier in the spring, it's a lot saltier in

the summer and it's about the same salinity in the fall, whether it's a dry year or a normal year. The Delta is not being held fresher.

That issue aside, it leaves open the issue what do we need and what do we want from the Delta. One, we don't know a lot about what is the best regime; if it is more fluctuating, how salty? How frequently? How fresher at other times? We don't have the answer to that right now. In the Supreme Court decision, there's not a word about fish. That has changed dramatically since the 1970s environmental laws. There are some things that are clear. We can't afford to study [the Delta] another 10 years. There are things we can and must do now. Emergency preparedness. Habitat; the state has already purchased lands. Those projects can go forward. Other things for water quality, water supply reliability can be done. None of these things preclude and none of these things promote a particular Delta configuration. Don't over invest. A plan that stages decisions is best. Ensure that incremental progress is starting right now and while you're doing that, ensure that you have better knowledge than you do right now. We can't stop doing things now because we don't know what our ultimate vision will be. There are things we can do now, and we have to do them in a smart way.

Tim Quinn: This report is the single best contribution to moving forward the policy debate on the Delta that I've seen in my career. You can like it. You cannot like it. But I don't think you can read this book and think of the Delta the same way as we did. It forces us to think about the Delta from different perspectives. MWD absolutely believes we have to take every action we can to restore the Delta. The southern California, Bay Area, central coast and San Joaquin Valley economies are not any better than the well being of the ecosystem we rely on for water. Very powerful laws mean we have to make it so. We unequivocally agree with the PPIC report that change is not only possible, but essential.

… MWD provided the first $30 million for Delta habitat restoration. We have spent billions of dollars to better manage water and reduce dependence on the Delta, to recycle water, conserve water, increase seawater desalination, etc. We manage water today in a better and different way than we did 20 years ago. Some people in southern California say we should just walk away from the Delta because it is so controversial. None of us can walk away from the Delta. We can't totally walk away. As much as you try to manage your way around it – we have done a good job restoring salmon populations, etc. north of the Delta and in finding other sources of supply south of the Delta – but we haven't tackled the problems in the Delta. The Delta is your source for replenishment water. The Delta is the place for water transfers. Southern California needs some Delta water because we need to balance the salinity of the Colorado River water. Water recycling plants, for example, won't work with Colorado River water alone. No matter how hard you try you can't walk away from this place.

The PPIC report's central premise is we have to go to a fluctuating Delta. But there's not quantitative defense of that. That will be debated and I think we should all welcome that debate. The report doesn't dictate outcomes. It is carefully structured. The researchers understand it is not their choice to make, but they are saying to all of us "choose." Choose if you want a natural Delta or not. If you want a natural Delta they say you need a fluctuating Delta. If that is true you either have to move the infrastructure – because we treat the Delta today as if it is a pipeline – or decrease water exports a lot.

> ***We can't afford to study [the Delta] another 10 years. There are things we can and must do now.***
>
> **– Greg Gartrell, CCWD**

Barry Nelson: There's a message to those of you in the room: if there was ever a moment for Delta people to pay attention to the future of the Delta, this is that time. This report highlights that we're likely to make decisions of tremendous implications for the future of this region. The report highlights problems that have been largely overlooked. Three simultaneous crises: an ecosystem crisis, a long term stability crisis and an institutional crisis.

He focused on five aspects/problems from the PPIC report:

1. Climate change, which was not even talked about five years ago, and the associated problems with sea level rise in the next century.
2. Flood control. If you live around the Delta or in the Delta you have the expectation that someone is looking out for you. That's not true. There is no flood control plan for the Delta.
3. Risk of ongoing urbanization. 130,000-plus homes are planned in the Delta. That has implications for the environment, agriculture and water quality. But growth in particular has implications for the ability to manage the Delta, and it is increasing the flood risk.
4. The opportunity to make decisions like creating a Yolo bypass in the south Delta. It could preserve agriculture, provide valuable environmental habitat and reduce flood risks. There's a huge opportunity but no one has developed a plan for how we're going to do that. We need to do it now because if the perimeter develops, it won't be possible to develop something like a south Delta floodway.
5. Need to evaluate a decrease in diversions. The environmental and fishing communities have been pushing for an honest look at how much water we divert from the Delta, what the consequence are, and how much water is needed to maintain the Delta as a living ecosystem. The Delta varied more than it does now but two years

ago we diverted enough water to cover the Delta 10 feet deep. There is a real question of how much water we can divert and have the Delta survive.

Steve Chappell: Explained that Suisun Marsh is part of the Delta; that it is part of the Delta fix. The resource conservation district represents landowners. In 1974 the landowners gained legislative protection from development with the Suisun Marsh Preservation Act. That is the same foundation for the Delta Protection Commission plan developed in the 1980s. For over 30 years the Suisun Marsh has been protected from development and encroachment. The marsh is 116,000 acres, including 52,000 acres of diked and managed wetlands. The PPIC report categorizes these diked wetlands as fresh water wetlands. That is not true. It is a brackish marsh. It has great [biological] diversity. Some of these native fish and plant species declining in the Delta, their stronghold is in Suisun. We have to work with the stakeholders in the marsh for the continued existence of the marsh. We have lots of opportunities for restoration projects.

Some people in southern California say we should just walk away from the Delta because it is so controversial. [But n]one of us can walk away from the Delta.

– Tim Quinn, MWD

The PPIC report is very fish centric. There are other native species dependent on Suisun Marsh. The marsh provides 52,000 acres of habitat even in a drought year. Many species are dependent on this patch of habitat that has persisted for 150 years. If these levees fail, they aren't going to have seasonal, flooded habitat. They're going to have deep water habitat, which they already have. We need to acknowledge that Suisun is part of the solution but it also has to be part of the long-term fix. Seven agencies are now working on a restoration plan for the marsh. Three alternatives are being analyzed through an EIR. And it's going to call for ecosystem restoration to contribute to the recovery of listed species. It also will call for the continued existence of diked wetlands for seasonal use for multiple benefits. Variability is important; we have the variability in Suisun. X2 is at Chipps Island – that is Suisun. You cannot find solutions for the Delta and the recovery of native species without Suisun. The problem is the majority of Suisun is privately owned. And to bring stakeholders to the table, there needs to be an incentive based program to say "there are solutions and you have to be part of the solutions, but it's not condemnation or broad based regulatory decisions that will condemn your land given that you've been stewards of this resource for 100 years."

Barbara Barrigan-Parrilla: Our concerns center on what was picked and used for data for historical salinity. Records from San Joaquin County and the SWRCB show that specific places such as Jersey Point in the Central Delta showed water freshness was not as variable as in the report. There were fluctuations, but fluctuations occurred during dry times or in drier months. When you had seasonal or annual fluctuations, you had greater freshwater inflow; you did not have as many upstream diversions as you have now. Our concern: we don't necessarily believe we need more research. PPIC report helped get the conversation going, but we see a runaway train. Decisions have already been made. This is the way the Delta should be. Let's get the Peripheral Canal going. We're saying no – we need to step back and really look at the data that already exists regarding salinity and water quality. Before you make any engineering decisions or decide on a course of action you need to answer the one question that has not been answered: How much fresh water needs to pass through the Delta to keep it healthy? In terms of agriculture, decisions were made in the second half of the century regarding the South Delta; they don't have the variability to use water that has a higher level of salinity than currently exists. The south end of the Delta has very poor water quality and if salinity were to increase, they would start taking losses on their fields and their profit margin shrinks.

Marci Coglianese: The statement that the Delta is not sustainable has been presented as a scientific conclusion, but I think it's a political conclusion, too. If you're not willing to invest in the Delta to make it sustainable, perhaps we're not interested in not investing to keep our coastline sustainable or our major cities that are at risk from earthquakes and climate change and sea level rise. There is embedded in this [report] a conclusion… I think that conclusion bears a little more analysis and I think the DRMS study will answer that question.

For now, let's assume the Delta is in serious trouble. We know the fisheries are. We don't really know the seismic risks. We do have to do something. My concern with the report is this question about framing the issue. Considering the credibility and credentials of the authors; I'm concerned the debate will be foreclosed and I'm not certain the report should have moved from making the recommendations it made to eliminating some options. Some hackles were raised in the Delta thinking [the report] is pointing to a conclusion. It's essentially an economic equation if you look at the dollar amounts estimated for the various recommendations. We really do not want to talk about keeping the Delta as it is, which for the first seven years of CALFED was the "deal." In 2003 the deal changed because the beneficiaries decided they didn't have any interest in investing in the levees. I was shocked by that. … I have listened carefully [during meetings] and believe levee engineers are our best sources of information for maintaining these levees and what they say is that a "do not resuscitate" list doesn't make any sense if you understand how the Delta works. I agree with 80 percent of the

report and I strongly agree with the recommendation to invest in science, R and D.

As a local government attorney who has dealt with land use for many years, this idea that we're going to have a growth moratorium in the Delta is DOA. … I asked a Building Industry Association representative at a recent forum about the idea of [linking] flood control and land use planning – an element in general plans or flood control being required in subdivision ordinances as a matter of state law. They backed away from that. The idea that we're going to continue urbanization with a moratorium … We need to come up with a workable way to deal with that issue. And we're not doing a service to what local government does and their financial constraints by shaking our finger at them and treating them like they're bad people. … On the other side, the BIA likes to say they're just meeting the demand. That's true, but they're also creating demand by moving out 15 years in front of development and getting options on land and creating the demand. Let's get serious. Let's use the report not as an ending point, but as a beginning.

Before you make any engineering decisions or decide on a course of action you need to answer the one question that has not been answered: How much fresh water needs to pass through the Delta to keep it healthy?

– Barbara Barrigan-Parrilla, Restore the Delta

Barrigan-Parrilla: I want to add that the media latched onto the report and the Peripheral Canal as if it were the solution. One of the things we appreciate about the report is the opportunistic Delta – reducing in exports and managing exports in a way that can restore the ecological health of the Delta.

Philp: I heard four variations of skepticism from the panel. We have some fluctuation skeptics who don't believe we need the increasing fluctuation in the Delta as PPIC suggests. We have political skepticism. And we also had some skepticism with what people know about Suisun Marsh. So you fluctuation skeptics, I brought in a gun, Peter B. Moyle, who speaks from the mountain through email. Philp said he asked Moyle about the skepticism about the salinity fluctuations. In his response Moyle said the historical salinity is not particularly relevant to the future of the Delta given sea level rise, increased frequency of floods and droughts, and other factors. If we see the way nature is headed we can either fight it and lose or go along for the ride fixing things to make the ride smoother. He doesn't care if you agree with him regarding the fluctuations or not.

Gartrell: I agree with his email. My disagreement is with the notion that the Delta is fresher. You can't take 20 million acre-feet out of the system and put it on farms in the Sacramento and San Joaquin valleys and leave the Delta with far less water and say it is fresher. That defies the law of physics. The issue is that the Delta doesn't fluctuate as much as it did because we take so much [water] out at particular times it makes it less fresh at those particular times.

I don't agree with his notion that we have the best of all possible Deltas. We have what we have and we have a changing climate. One hundred years ago 45 percent of the water that came into the Delta from April through July was snow melt. We're down to 35 percent from snow melt and that figure is changing. The issue is what levels are optimal. We don't know what those levels are. … What we're saying is don't do anything stupid that locks you in one way or the other. There are things you can do now regardless of what vision comes out as part of your 20 to 30 year plan.

I'd like to add that out of that 20 million acre-feet that comes out of the system, only 1 million acre-feet goes to MWD from the Delta. As the PPIC report points out, 64 percent of the water is used upstream and never reaches the Delta. The Bureau of Reclamation just released its water supply allocation for CVP contractors. North of the Delta contractors are getting 100 percent; south of the Delta exporters are getting 50 percent. If you're going to focus on solving this problem on just the exporters you're missing two-thirds of the water. This is the crux of this issue…

Philp: In the CALFED process, MWD was very reluctant to study alternatives that decreased diversions from the system; everyone was going to get better together. Now it's a new world with other options on the table that clearly suggest less diversions. Does MWD think that [less water diversions] should be studied as well as the Peripheral Canal option PPIC identified?

Quinn: Yes. … In the past, actions that may or may not be necessary to protect the Delta floundered on the north vs. south debate, and swimming pools and subsidized farmers with cigars always entered into the debate. The MWD board has a dramatically different set of policies than in the past. It was always complete the State Water Project. We have a contract. We want you to deliver it. That's not the policy of today. The policy today (outlined in an April 2006 MWD board letter), emphasizes the importance of sustainability of the Delta. It's export neutral, we're not looking for more water but we would like to protect what we have today, that we will grow on local resources in southern California, and [only] occasionally come to the market. That's very different set of policy principles. … We have to be willing to look honestly, openly at the reduced export alternatives. They are a viable alterna-

tive…. Obviously we want to look at the economics of that. … At the same time I expect others to be willing to look open mindedly at moving the intake and changing the infrastructure so we can do an honest comparison of which one is most likely to get us where we need from an environmental, water supply and economic perspective.

Philp: Barry, are you ready to study the Peripheral Canal on equal footing with the eco-Delta proposal?

Nelson: The PPIC report is proposing to take the status quo off the table; that we need to change the Delta fundamentally. Some people say that conclusion might be overstated. But we agree with the issues that they cited. We're at an interesting point because there are no ideas left on the PPIC list that everybody loves. So if our community says the Peripheral Canal is off the table and we're going to boycott the process because it's on the table, or the water community says reduced diversions have to be off the table and we're going to boycott the process because they're on the table, pretty soon we have nothing left on the table or no one is in the room.

Do we think we have to step back and look at broad range of options? Yes. That said we've long been critics and skeptics of the Peripheral Canal. If we take the water out of the system above the Delta, what does that mean for the ecosystem? For water quality? Those things have not been analyzed. And what happens to the maintenance of Delta levees if the canal is built? That's a political question and there's no good answer to it. But there's another question; behind that alternative is an assumption that if you have a great Peripheral Canal plan, that it will be fairly implemented. We have painful experience in that regard: the San Joaquin River, where plumbing left it dry. The Sacramento River hasn't been dry. In order to get water from the river, you have to run it through the Delta. The plumbing in the Delta has tremendous implications. Plumbing in the Delta is operated with the exporters in mind and not with regard to in-Delta farms and the ecosystem. We will not fight to keep it off the table, but we have a lot of hard questions.

Philp: Steve, no matter what option we take, PPIC is suggesting that your world totally changes. We're going to shift the duck hunting and some of the other functions of the Suisun Marsh to the Central Delta and manage Suisun Marsh for pelagic fish. Changing your world is one of the short term things we should do now while we debate the other ideas. Instead of arguing it on the merits, let's just assume that's the way to go. How do you work with your community when there are so many private landowners?

Chappell: It may be a surprise to many people, but that discussion is already started. Through the EIR process we have three alternatives ranging from 3,000 to 13,000 acres of tidal restoration that are going to go through the entire EIR process. But there is an understanding that we're trading wetland values. As you shift from diked, seasonal wetlands that provide existing functions, you're going to reduce that area. How do you enhance the rest of the area that remains the marsh: levee system integrity; improving the levees? Suisun Marsh levees have been on the "do not resuscitate list" for 50 years. Only a minimal amount of public money goes into a mile and a half of levees in the legal boundary of the Delta; otherwise it's all been privately supported.

With willing sellers and a wise, planned approach to restoring areas that provide the maximum ecosystem benefit, what is the exchange rate? We want to do it in an area where you get the most ecological value for the listed species. We're looking at balancing these things for the long-term sustainability of the waterfowl with less area, and develop other areas into different types of habitat. But there are agency restrictions on land ownership, implementation costs, and flood liabilities for neighbors. … Suisun is where a lot of it is going to happen. But we need to develop short term plans to sustain the marsh's values as we work to develop and implement the long term strategy.

> ***As a local government attorney who has dealt with land use for many years, this idea that we're going to have a growth moratorium in the Delta is DOA.***
>
> **– Marci Coglianese, DRMS**

Philp: Let's stay on the "do not resuscitate" theme. The state paid to resuscitate Jones Tract. It wasn't the landowners themselves paying to bring that island back. Why should the state pay more to bring an island back than the actual assessed value of the island? Why shouldn't the state have the option of paying that landowner the value of the land but not bring it back? Why should the state be locked into bringing each and every island back regardless of the cost?

Barrigan-Parrilla: One of the things we've questioned about the PPIC report is it worth paying $100 million to bring back $30 million worth of land? But it seemed that there was that much more to protect; that there was additional infrastructure to protect as a result of bringing back the island. We think the $30 million answer is inadequate.

Coglianese: I don't recall the precise numbers but the people involved in bringing Jones Tract back think that's vastly inflated. It includes a lot of things not directly related to closing the breach and dewatering the island. Looking at the Delta as a system, the local knowledge says you can't pick and choose. The experience is when one island goes down there are impacts on the adjacent island. And we are concerned about a de-investment strategy over time in the Delta if that happens.

Philp: One of the short term actions in the PPIC report deals with seismic safety and emergency preparedness. I know MWD and the state have been looking at how to prepare for earthquakes. Is that something we can do short term?

Quinn*:* Yes. Post-Katrina a lot of people started looking at the Delta. The Delta's below sea level. New Orleans is below sea level. Each is protected by inadequate levees. What happens if there's an earthquake in the Delta like Professor Mount has been warning us? Even if the probability rates are low, from the viewpoint of the MWD board, it's an unacceptable risk. Staff is looking at what kind of actions we can take to deal with a catastrophic levee failure. The short answer is … we've looked at a wide variety of alternatives. Things you can do to spend money in the Delta in advance of an outage, things you can do to respond after the event and we have come to the conclusion that there are reasonable actions that can and should be taken to protect the economy and the water supply… Lives have to be the first priority. …. But at some point you do need to be concerned about how you restore the water supply for a trillion dollar economy. Our fear is that we would be out two to three years which would push on the catastrophic economic consequences. If we can manage it so it's six months to nine months and manage capability south of the Delta to keep the water supply going at a reduced, but acceptable level for a period of time. I won't be arguing that you have to build a Peripheral Canal because we might have an earthquake. It would protect you well during an earthquake, but there are other things that you can do.

> ***We're at an interesting point because there are no ideas left on the PPIC list that everybody loves.***
>
> **– Barry Nelson, NRDC**

Philp: I want each of you to give an honest answer; you have to pick one of these PPIC alternatives. Look into the crystal ball and give us your best bet of the one we'll actually end up doing. I am going to start and I choose the San Joaquin Restoration Aqueduct. I think we'll do a variation of the Peripheral Canal that will solve some San Joaquin and South Delta problems because it's the biggest constituency of a Peripheral Canal.

Gartrell: I don't think it's going to be any one of those five.

Philp: You have to choose the one that's closest to this.

Gartrell: I don't think it's going to be any one in particular. I think it's going to be closest to either 1 with a small canal on the order of something nowhere near what was produced in 1982 or it's going to be something closer to the opportunistic Delta.

Quinn: I have to emphasize that MWD's policies have been to support through-Delta actions all through CALFED. My current instruction is to make sure all the options are on the table. We welcome something like the PPIC report that looks at a wide range of options. We are willing to look at alternatives that might involve a reduction in exports or that might involve a $3 to $4 billion facility. My board hasn't chosen. As an expert in this system I think you're looking at something like Alternative 5 plus 8.

Nelson: What's my pick? Or what are we going to do? I prefer some version of the opportunistic/ecosystem Delta. No surprise there. What do I think is actually going to happen? I actually fear that the most likely outcome is gridlock.

Philp: The abandoned Delta?

Nelson: An outcome that I think that would be a disaster for everyone in the room including Tim. I think we have to recognize that we have not successfully tackled challenges in the Delta.

Chappell: I think I have to support the idea of gridlock and that the no-action alternative of our current situation is probably going to persist. You're looking at a 20 to 30 year horizon where we would come up with a solution and for it to be funded and I'm concerned there's not the political will to sustain our existing functions in the interim until the bigger plan can happen.

Barrigan-Parrilla: We prefer the opportunistic Delta but we have the same fear – that it's going to be the abandoned Delta.

Coglianese: Tom, I agree with you. And I thought my reason would be more political than anybody else's but I heard Tim Quinn's response… My response is that the San Joaquin River aqueduct is the likely frontrunner because it deals with several issues at once and frees up the north Delta for the ecosystem preferred alternative. And it divides the Delta against itself, which is a byproduct that we can't look at a monolithic Delta any longer. But from a political standpoint, unless we stand together we don't have a leg to stand on.

Question from the Audience: Regarding the eco-Delta; you say there are high costs involved. Do you think those costs are worth bearing?

Nelson: What's interesting is that none of the alternatives are cheap. There isn't a cheap solution out there. So we have to decide what we're going to invest in. We're not going to see the Delta restored to what it was in 1850. But we can say with certainty that we need to reduce our reliance on the Delta for lots of reasons and [restore] habitat in the Delta for lots of reasons. [Habitat restora-

tion] will help us reduce our flood risk and provide habitat for endangered species. … We need to make a big investment in the Delta and we need to have an honest conversation up front about who's willing to pay for what. … Whatever we do with the Delta is something that's going to cost a lot of money. … If we know it's going to cost $10 billion to tackle the Delta's problems we need to have a serious discussion about the best way to invest that money. Using that money to reduce pumping in the Delta, we can make a huge dent in decreasing our reliance on the Delta.

Question from the Audience: I heard a suggestion that all the water in the valley that comes into the Delta ought to be part of the equation. Senior water rights and area of origin water rights might have something to say about that but I think it gets to the question of who pays for the Delta fixes? Beneficiary pays vs. $1 month for all users in California. A lot of the state's economy is tied to the Delta, but should you charge people in Eureka or Alturas or around Mono Lake for the Delta fixes?

> ***We're looking at balancing these things for the long term sustainability of the waterfowl with less area, and develop other areas into different types of habitat.***
>
> **– Steve Chappell, Suisun Resource Conservation District Program Director**

Gartrell: Yes, the Legislature can do that, whether they ought to, that's a different question. …. The ESA doesn't recognize area of origin or water rights. The people upstream are getting their water out of the reservoirs, which are regulated. Just because you have senior water rights doesn't mean you're necessarily out of jeopardy.

Quinn: There are potentially three cost centers in the solution. One, the investment in infrastructure in the Delta; to the extent that that's part of the package, the water users should pay for that and they're prepared to do so. Second, all the landscape changes in alternative eight; they won't all happen, but a major portion could happen. … Three, if the PPIC report is found to be right and if we change how we think about water quality in the Delta, you're going to have to rewrite our water quality control plan, which is what we did in the Bay-Delta Accord. We re-negotiated the water right permits that govern how the projects operate and lived by them ever since. What the PPIC report is contemplating as part of a major restructuring of how we restore the Delta would be another major rewriting of SWRCB water quality control plans that could well reach up to others in the watershed because they affect the salinity in the Delta and the ability to fluctuate in the Delta.

Gartrell: It's not only rewriting the water quality control plan, you're going to have to change federal law – the Coordination Operations Agreement. When it was enacted into federal law Congressman George Miller put in a line or two that requires the Secretary of the Interior to meet certain water quality standards protecting Contra Costa Water District.

Question from the Audience: The islands in the Delta, the insides of those islands are not rocked. If you have one of these islands that do collapse and you don't go in like Jones [Tract] and restore it, you'll wind up losing the islands around it and pretty soon you have an ocean out there. I don't think you have a choice about not reclaiming an island because there will be a domino effect.

Quinn: That's a very good point. If you make that land use decision – and some islands might be willing to do that – don't think it's going to be free. It will cost you a lot of money.

Nelson: The report points out precisely that risk. If you don't deal with protecting the inside, you could end up with a chain reaction like that.

Hanak: I wanted to thank Tom and the panel and say that our aim in doing the report was precisely to help jump start this kind of discussion and debate. •

Appendix A

Written Responses to Breakout Group Questions

Discussion Topics:

1. Review the list of "trends" from the "Status and Trends Report" and discuss which you believe are most likely to threaten your vision for the future of the Delta.
2. From the "Status and Trends Report," the discussion of drivers of change and other recent reports on the Delta, what assumptions about the future of the Delta do you question, and why?
3. There is significant emerging concern about land use trends in and around the Delta and their potential impact on the future of the Delta. What do you see as the major land use concerns (if any), and as possible solutions to those concerns?

TABLE 1

Discussion Topic #1: Threats

- The idea that the Delta is expendable
- Agencies have Fiefdoms
- Suisun Marsh/Bypass Issue: Salinity is the issue and the goal is to keep that balanced. The northern bypass will achieve that and take the floodwater out the gate.

Discussion Topic #2: Assumptions

- Housing and development pressures – politics and money
- Caltrans 2020 traffic forecast on Route 4
- Any alternative that assumes control of nature or politics

Discussion Topic #3: Land Use Concerns/Solutions

- Infrastructure – money and who gets it.
- Best projects – win-win, or winners and losers
- Agency people are afraid to whistle-blow.
- Developer obligation of 10 years is too short
- County level land use (guidelines)
- Rapid urbanization is a threat in itself
- Goals-timing-milestones-implementation
- Affordable housing or set aside for nature: why are these things being set against each other?
- One has a voice in government. The wildlife and earth needs us to speak for it. These are not equal entities and it is not equitable to compare them.
- Maintenance schedules need to be kept and erosion monitored. Satellite surveys of levee elevation on a regular basis.
- The pollution problem is left out. Household hazardous waste. Motor repair shops and other facilities at or below sea level.
- The New Orleans levee break problem of pollution is something we can avoid. Cost of cleanup, water treatment.
- Earthquakes – USGS has very little data in the Delta. However, the Delta was likely formed by earthquake faults.
- USGS & tide monitoring in more places and prior to any implementation have a strategy of data collection and studies for real time/location info to be used in design.

TABLE 4

Discussion Topic #1: Threats

- Urbanization and development limits options
- Increased water diversions and associated financial issues for the state
- Short-term view of environmental protection: vision needs to be longer-term; conservation and restoration; preserve it to pass on to the future.
- Development threatens: cuts off options for clean, healthy water. The money is a distraction.
- Accumulation and long-term effect of toxins
- Loss of recreational uses – need more public access

Discussion Topic #2: Assumptions

- Question the assumption of population growth and urbanization. Example: Bear Island legacy

Discussion Topic #3: Land use concerns/solutions

Solutions:

- Public education
- More infill
- Slow growth policies
- Better regional planning/coordination
- Water conservation (especially Southern California)
- Sustainable/conservation
- Organic farming practices (to support water quality)
- Alternatives for landowners who want to sell
- Protect Delta flows

TABLE 5

Discussion Topic #1: Threats

- Subsidence on islands where peat soils continue to be conventionally farmed
- Reduced options for future management choices for other resources with urbanization covering more land
- Many counties involved; that makes it more challenging to implement solutions. Agency planning has huge influence.
- Species known to be problems in other regions are likely to invade the Delta-Suisun.

Discussion Topic #2: Assumptions

- We don't question any. They all have an impact

Discussion Topic #3: Land use concerns/solutions

- Building in flood zones (residential land uses)
- Coordinating growth between cities/counties. State and various counties should work together. Need a regional organization with money and authority
- Population creates transportation issues and general infrastructure demands/needs
- Agricultural land use. Revise water use towards conservation to minimize island subsidence. Use recycled water from waste water treatment plants.

TABLE 6

Discussion Topic #1: Threats

- Oxidization – too fast
- Seismic activity
- Burrowing animals (levees need protection)
- Limits on materials (costs/regulation) to fix levees
- Development too close to levees
- Lack of equipment and material for emergency

Discussion Topic #2: Assumptions

- Subsidence (end point?)
- Can political entities work together?
- Economic feasibility (implementation)

Discussion Topic #3: Land use concerns/solutions

- Emergency Response: Streamline, provide money (tax money)
- Governmental bodies aren't centralized concerning the Delta. Local control/responsibility.
- Development below floodplain
- Lack of drinking water in Delta islands

TABLE 7

Discussion Topic #1: Threats

Ranked from things we can't control that have urgency to things we can control and that won't impact the region for a long time. Top concerns:

- Seismic event – sudden and catastrophic to ecosystem, infrastructure, drinking water.
- Introduced species – hurts ecosystem, recreation
- Subsidence
- Climate change
- Urbanization (This groups it is not particularly interested in urbanization, though outraged by some recent proposed development, when prompted) One member states: I think urbanization is a huge problem/challenge in the Delta because it exacerbates the impacts of all other concerns.

Discussion Topic #2: Assumptions

- Re: Seismic Event. Though a top concern because of potential ramification, there was doubt about the science, models, legitimacy of the seismic warnings. The likelihood of catastrophe was perceived as low, but no one wanted to risk it.

Discussion Topic #3: Land use concerns/solutions

- Don't build in the floodplain or behind levees – endangers people. Public safety and fiscal responsibility.
- Loss of prime agriculture to urbanization changes economy and character of Delta communities
- Recreation: fear loss of public access, recreation opportunities and reduction in quality of recreation (over crowding, wear & tear on infrastructure, etc.) Need to protect these things.
- Water quality: Increased storm water causing a decrease in water quality for environmental uses; drinking water extraction and recreation.
- Water quantity: Increased extraction decreases water available for other uses: fish, recreation, habitat, etc.

TABLE 8

Discussion Topic #1: Threats

- Continued development in the Delta
- Sea level rise
- Lack of balance between natural processes and human impacts
- Unwillingness to compromise or change

Discussion Topic #2: Assumptions

- Salinity benefits for native fish and historic regime
- Agriculture is expendable – let levees go as can be bought out
- The term sustainable – exit strategy – like buy business plan

Discussion Topic #3: Land use concerns/solutions

- Just say no. Should not be putting people at risk in flood-prone areas.

TABLE 9

Discussion Topic #1: Threats
- Policies concerning the Delta must include the Suisun Marsh
- Recreational needs/pressures are paramount
- Strength of levees
- Better coordination of reservoir releases, especially as they pertain to tides
- Funding for levee maintenance is crucial
- Additional water storage facilities
- Delta urbanization should be limited

Discussion Topic #2: Assumptions
- Greenland's meltdown
- No evidence of significant seismic activity in the Delta
- That its environmental uses will ever be abandoned completely

Discussion Topic #3: Land use concerns/solutions
- Urbanization and residential pressures. Period.

TABLE 10

Discussion Topic #1: Threats
- Simplistic sense that Delta is not sustainable.
- Many people involved in visioning Delta haven't been there.

Discussion Topic #2: Assumptions
- Seismic analysis

Discussion Topic #3: Land use concerns/solutions
- Housing behind levees – can't prevent it.
- Low economic land uses

TABLE 11

Discussion Topic #1: Threats
- Urbanization within the Delta and outside the Delta based on-out-of basin exports.

Discussion Topic #2: Assumptions
- Need to define the components of sustainability.
- Question the non-sustainability reported in the PPIC report.
- Question the degree of the risk of levee failure; they can be improved to avoid catastrophic failure.

Discussion Topic #3: Land use concerns/solutions
- Concern: urbanization.
- Possible solution: more coordination among regional counties to make economic decisions to provide a thriving Delta.

TABLE 12

Discussion Topic #1: Threats
- Lack of common-sense decisions
- Political indecision
- Lack of acceptance of public input
- Educate the people

Discussion Topic #2: Assumptions
- A doubt that the historical ideal can be met.

Discussion Topic #3: Land use concerns/solutions
- Land use: check development. Create a balance between natural open space and affordable housing.

TABLE 13

Discussion Topic #1: Threats
- Significant earthquakes with multi-island failure. South more impacted water-wise. All impacted by massive social response.
- More demands on Delta resources – recreation

Discussion Topic #2: Assumptions
- Invasive species. Quagga mussels will get here. May have fluctuating abilities to treat all invasive species.
- Climate change. More water (rain) less snow. Need to re-design – operate system

Discussion Topic #3: Land use concerns/solutions
- Urbanization Issues: Stops flexibility, more at risk, etc.
- Ag Land: How to keep it economically sustainable. Will they be there as stewards?
- Other issues: Water transfers to help issues above. Need to make better/easier physical transfers/storage.

TABLES 16 AND 24

Discussion Topic #1: Threats
- Indecision
- Urbanization
- Adequate and sustained financial support for levees

Discussion Topic #2: Assumptions
- We don't question any assumptions

Discussion Topic #3: Land use concerns/solutions
- Trade off between short-term economic gain and long-term sustainability.

TABLE 20

Discussion Topic #1: Threats

- Urbanization: Unplanned and uncoordinated building. The rive Islands in Lathrop – not good planning. Urbanization affects many uses
- Salinity (intrusion) Stop salinity movement – affects water quality and fish. Having to close islands because water too close to use for farming. Will also affect agriculture in North Delta – it won't tolerate salinity.
- Sea-level rise and high winter flows (more rain than snow): "Pineapple express" problems – wind leads to levee failures. Rio Vista would be impacted by sea level rise.
- Vision: Hard to re-do everything. Too expensive. Levees are a constant problem.
- Developer fees; developers don't pay for levees.
- Pressure on agriculture from urban and other open space uses.
- What are the effects on the whole Delta with flooding of islands? The PPIC report pushes more fluctuation in salinity. How far will salinity intrusion go into the Delta? Is fluctuating salinity worth the cost?

Discussion Topic #3: Land use Concerns/Solutions

- State government as a whole doesn't buy into the importance of agriculture to the California economy. The Delta is still small, family farms. Tradeoffs and importance of this hasn't been studied
- There are other ways of looking at the Delta. From an agricultural perspective – end up looking at each island as multiple use (i.e., some islands subsided more, need to look at alternatives such as rice, tules for carbon credit exchanges)
- Ag and Rec and Tourism. There are multiple uses if you keep urbanization out.
- Less subsidence in the North Delta because of crops. Lots of tilling, but there are crops that don't contribute to subsidence.
- Need to treat Delta regions differently and come up with creative solutions/multiple uses.
- Centralize urbanization and keep agriculture, although the cost and politics make this hard.

TABLE 21

Discussion Topic #1: Threats

- Water precipitation. Alteration of hydrologic scheme in this area. Storage, timing, capacity, conveyance
- Threat of flood in this area, yet the people, money and votes are in Southern California.

Discussion Topic #2: Assumptions

- Need to assess this holistically. The issue needs leadership, not piecemeal projects. Look at the entire system, conveyance capacity.

Discussion Topic #3: Land use concerns/solutions

- Flooding, water flow are changing the Delta.
- Infrastructure and landscape minimizes your opportunities.
- What's the use or purpose of the Delta? Water quality, agriculture, infrastructure, homes.
- Need to prioritize agriculture – agricultural viability
- Delta land use are: 5 counties and all cities to create Delta Land Use Plan using invisible jurisdictional lines.

TABLE 22

Discussion Topic #1: Threats

- Anything that precipitates significant levee failure
- Catastrophic event which produces further problems – flooding, habitat failure, etc.
- Soil degradation and other trends that increase risks of catastrophe.
- Other increased risks; islands vs. levees
- Failure to deal with subsidence
- Urbanization

Discussion Topic #2: Assumptions

- Amount of pumping
- Preservation of agriculture – is the value of the agriculture worthy of preservation
- Ability to retain or restore native fisheries
- Appropriateness of maintaining bass fishing

Discussion Topic #3: Land use concerns/solutions

- Urbanization
- Development in floodplains and below sea level
- Inability to locate development in appropriate locations resulting in development in inappropriate locations
- Loss of heritage and lifestyle.

Solutions:

- Identifying appropriate locations for future development
- Allocate revenue from urban development to preserve agricultural uses.

TABLE 27

Discussion Topic #1: Threats

- Climate change & sea-level rise
- Endangered species & invasive species
- Lack of enforcement of existing laws. Defunding of projects.
- Fiscalization of land use to support necessary services in communities
- Lack/deficiency of regional planning. Planning is local in nature. Difficulty in integrating planning, for instance, with adjacent cities.
- Price of housing is pressuring land conversion

Discussion Topic #2: Assumptions
- Subsidence: Cost benefit analysis of which islands should be saved/improved/abandoned
- More flooding
- At what level should the Delta be sustained

Discussion Topic #3: Land use concerns/solutions
- City and county housing requirements under pressure. e.g., state requirements to produce so many units of housing with so many of those units being affordable.
- Consider increasing density levels. Downsides: pressure on water supply/quality. Quality of life issues. Transportation – lack in the Delta. Increased air quality problems.

TABLE 28

Discussion Topic #1: Threats

Governance: lack of strong leadership to prioritize the numerous problems and priorities and apply solutions that work to provide a better future. There is no integration of governing levels.

Major factors in order of importance:
- Urbanization and increasing population
- Downward trend in water quality
- More winter flooding
- Subsidence; topsoil redistribution

Minor factors in order of importance
- Introduced species
- Seismic Activity
- Sea Level Rise

Discussion Topic #2: Assumptions
- Can the Delta sustain any urban population growth? Period.
- Our group questions whether capitalism will work to foster sustainable practices regarding land elevations in the Delta region.
- Planning needs to focus on sustainability and public safety instead of values like "profit" and asking whether a project will pay for itself.

Discussion Topic #3: Land use concerns/solutions
- Sustainable urban land use/applications. Mother nature does not contribute to politicians' re-election campaigns, therefore receives minor consideration in planning and project developments.
- Portable gates and locks. Think about trying to apply the Panama Canal model for managing the Bay Delta.

TABLE #UNKNOWN

Discussion Topic #1: Threats
- Urbanization, because it precludes other actions.

Discussion Topic #2: Assumptions
- That we really know how the salinity ranged historically. There is conflicting information and suppositions.

Discussion Topic #3: Land use concerns/solutions
- Urbanization including associated activities.
- Non-point source pollution

TABLE # UNKNOWN-

Discussion Topic #1: Threats
- Water Conveyance
- Concern over access and channelization control
- Urbanization issues
- Who is ultimately making the decisions
- Not the representation over concern of those physically affected
- Emergency infrastructure concerns: who leads, dictates, oversees, administers

Discussion Topic #2: Assumptions
- Model-ability to accuracy
- Why isn't the State interested in the local recreational benefits?
- Are the goals to keep a WQ state for UR/MI/AG, or bring back a "natural, healthy, brackish environment?"

Discussion Topic #3: Land use concerns/solutions
- Using Delta as thoroughfare
- HDD
- Excessive diversion concerns based on land use

TABLE # UNKNOWN

Discussion Topic #1: Threats
- Residential growth
- Invasive species: non-native animals, plants, fish – crumbling ecosystem
- Money – too much money. Is it a lost cause?

Discussion Topic #2: Assumptions
- Ambiguous – The vision of the Delta

Discussion Topic #3: Land use concerns/solutions
- Urbanization is a huge concern. Solution: Smart land use planning decisions.

TABLE # UNKNOWN

Discussion Topic #1: Threats

- Additional winter flooding in spring/summer.
- Temperature change, resulting in early runoff
- Concerns include areas of lower estuary – Carquinez Bridge
- We are impacting Southern California, fish in the Delta and elsewhere with whatever happens in the Delta.
- Introduced species growing uncontrolled
- Current water management practices may affect and support introduced species.
- Population growth/affordable housing issue will impact Delta negatively

Discussion Topic #2: Assumptions

- Subsidence effect on levees. It is not as widespread as people think it is.
- The greater flood control scheme in the Delta and how it interfaces with development and water management.
- The trends act together to impact the Delta.
- Is it worth letting go of a couple of islands for the whole Delta?
- Will Counties actually be able to work together?

Discussion Topic #3: Land use concerns/solutions

- Where there are entitlements (water rights and land rights) involved, is there a solution or will we have to work around them?
- We have to make provisions, work with easements, with landowners.
- Issues: (1) Development; (2) With areas like Stewart Tract, you just have to move on and come up with a plan that addresses the region, not just the Delta.

TABLE # UNKNOWN

Discussion Topic #1: Threats

- Urbanization
- Climate change
- Earthquakes

Discussion Topic #2: Assumptions

- Agree with all drivers, overall. It is important to note that the only one we truly have control over is urbanization.
- The group questioned using the term subsidence to describe oxidation.

Discussion Topic #3: Land use concerns/solutions

- Concern: Urbanization in deep floodplains
- Solution: Just say no.

TABLE # UNKNOWN

(appears to be an individual comment)

Discussion Topic #3: Land use concerns/solutions

- Visualize the Delta as a giant redevelopment project. The state should buy it, fix it, and sell (at least part of) it back, with appropriate easements and use conditions to sustain the fix.
- We talk endlessly about The Fix, while urban encroachment limits our options more and more because we won't secure the property.

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